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The following pages will outline a case study, which shows the benefits in energy and cost savings of properly installed mechanical insulation.

Insulation is a proven means for conserving energy, reducing greenhouse gas emissions, increasing process productivity, providing a safer and more productive work environment, controlling condensation (which can lead to mold growth), supporting sustainable design technology and a host of other benefits.

Mechanical insulation does all of this, while providing a return on investment (ROI) rate, which is seldom rivaled. Despite the proven ROI, insulation is often overlooked and its benefits undervalued. Insulation is truly the lost or forgotten technology. Can you think of a more important time than now to think about how insulation can help you?

An insulation system is a technology, which needs to be engineered and maintained throughout the entire process. Several studies have estimated roughly 10 to 30 percent of all installed insulation is now missing or damaged.

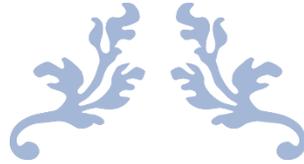
The practice of not replacing or maintaining an insulation system in a timely and correct manner reduces the full benefits of insulation, and in return, decreases the ROI. In many cases, significant other issues - such as excessive energy loss, corrosion under insulation (CUI), mold development, increased cost of operations and reduced process productivity or efficiency - develop.

You can learn more on www.MechanicalInsulatorsLMCT.com, where additional case studies can be viewed.

Please do not hesitate to contact me should you have any additional questions.
Thank you,

Peter Ielimi

Executive Director
Mechanical Insulators Labor Management Cooperative Trust



INSULATION ENERGY APPRAISAL FINAL REPORT

For
Millidgeville North School
Saint John, New Brunswick



Presented by:
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Heat & Frost Training Centre
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Executive Summary

The insulation energy appraisal evaluated the performance of mechanical rooms at your facility. All piping is currently insulated with 1-inch thick fiberglass insulation. Based on the analysis findings, the appraiser calculated a) the cost of operating line with existing insulation; b) the cost to operate with 1 inch thick fiberglass vs 1 ½ thick fiberglass. He also calculated emission saving if each facility was properly insulated. These calculations are summarized below.

Energy Cost

Heat loss at Millidgeville North facility listed at 862146 Kbtu per year
An estimated 5 year saving of \$192561.10, and a simple payback return on investment in 1.3 years

Energy/Emissions Savings

Co₂ reduction at Millidgeville North facility 58 Mt per year

Insulation and Energy Efficiency

Insulation systems improve the energy efficiency of a plant and reduce the level of emissions of greenhouse gases into the atmosphere. Systems that have an upgraded insulation system can achieve an even more dramatic increase in savings. A properly selected, installed and maintained insulation system can, in many cases, provide an excellent return on investment and quick payback through cost savings. When compared to other conservation measures, the payback is often very quick - usually less than six months. The savings are significant in terms of reduced energy use, increased efficiency, and reduced greenhouse gas emissions.

Conclusion

The appraiser commends Millidgeville North Facility on upkeeping and maintaining their insulation systems. The Millidgeville North facility insulation system is very well maintained also, and the finding show a relatively positive energy efficiency. Our analysis show that though each facility is believed to be insulated with proper thicknesses. But due to facility maintenance, there are some areas that, if insulated to meet the rest of facility insulation standards, would be able to significantly reduce their energy loss and reduce the level of greenhouse gas emissions.

**ENERGY AUDIT
MILLIDGEVILLE
NORTH
SCHOOL**

Total Heat Loss

5 year savings of

\$ 192,561.10

CO₂ Reduction of

58 MT/Year



Benefits:

- Simple payback period
- CO₂ Reduction
- Personnel safety

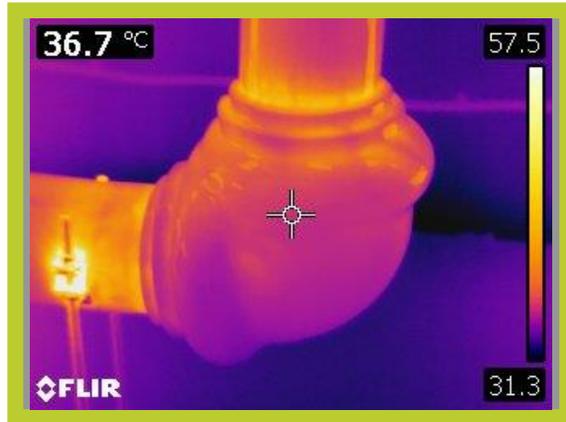
Audit Done By:

Joshua Sherrard

Certified Thermographer

Certified 3E Plus Auditor

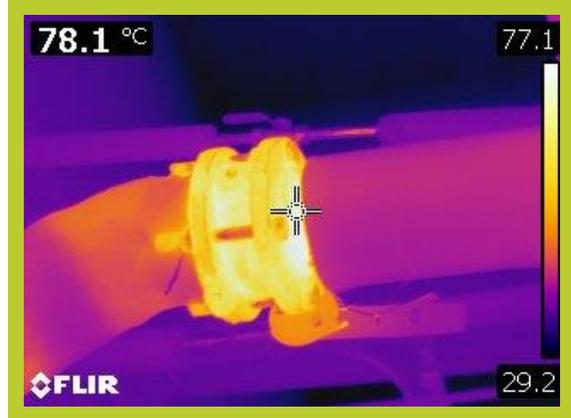
Pump Room



Operating Temperature,	58°C	Emittance of Surface	0.95
Ambient Temperature,	79°C	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	91200	\$ 2292.75	\$ 2292.75	\$ 11463.75	6
1	12150	\$ 306	\$ 1986.75	\$ 9933.75	0.75
1.5	9000	\$ 225.75	\$ 2067	\$ 10335	0.75

Pump Room



Operating Temperature,
Ambient Temperature,
Insulation selected

78.1°C
22 °C
Fiberglass

Emittance of Surface
Expected Useful Life of Insulation System
Operating hours per year
Efficiency of fuel Conversion%
Selected fuel

0.95
20 yrs.
8760
85%
Natural Gas

THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	2766	\$ 69.60	\$ 69.90	\$ 349.50	0.18
1	396	\$ 9.90	\$ 60.00	\$ 300.00	0
1.5	300	\$ 7.50	\$ 62.40	\$ 312.00	0

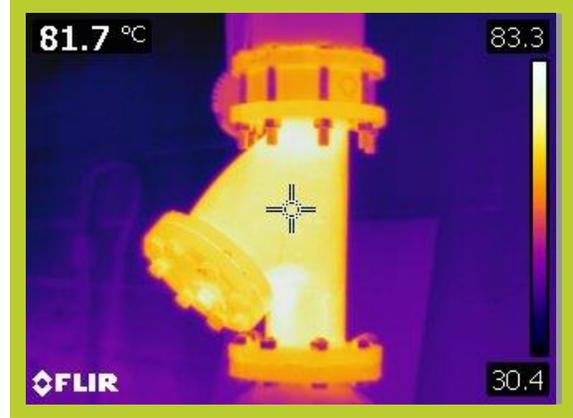
Pump Room



Operating Temperature,	84°C	Emittance of Surface	0.95
Ambient Temperature,	22 °C	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	32310	\$812.34	\$ 812.34	\$ 4061.70	6
1	4050	\$ 101.70	\$ 710.64	\$ 3553.20	0.75
1.5	2970	\$ 74.52	\$ 737.82	\$ 3689.10	0.75

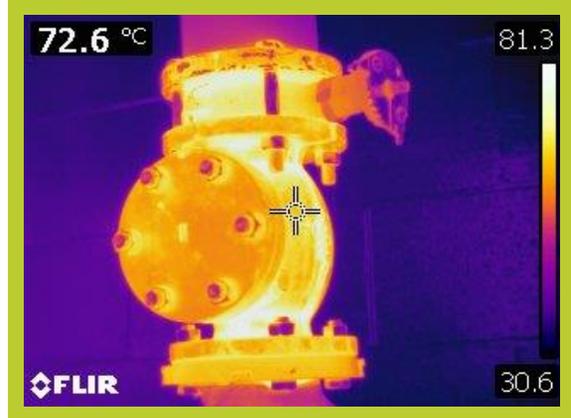
Pump Room



Operating Temperature,	83*°C	Emittance of Surface	0.95
Ambient Temperature,	22*°C	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr	5yr.	CO2 EMMISSIONS
			SAVINGS.	SAVINGS	
0	16616	\$ 417.84	\$ 417.84	\$ 2089.20	0.56
1	2056	\$ 51.68	\$ 366.16	\$ 1830.80	0.08
1.5	1504	\$ 37.76	\$ 380.08	\$ 1900.40	0.04

Pump Room



Operating Temperature, *F
Ambient Temperature, *F
Insulation selected

Emittance of Surface	0.95
Expected Useful Life of Insulation System	20 yrs.
Operating hours per year	8760
Efficiency of fuel Conversion%	85%
Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr	5yr.	CO2 EMMISSIONS
			SAVINGS.	SAVINGS	
0	1464	\$ 297.48	\$ 297.48	\$ 1487.40	0.39
1	1074	\$ 36.84	\$ 260.64	\$ 1303.20	0.06
1.5	358	\$ 27.06	\$ 270.42	\$ 1352.10	0.03

Pump Room



Operating Temperature,	78°C	Emittance of Surface	0.95
Ambient Temperature,	22°C	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr	5yr.	CO2 EMMISSIONS
			SAVINGS.	SAVINGS	
0	11070	\$ 278.34	\$ 278.34	\$ 1391.70	0.72
1	1380	\$ 34.74	\$ 243.60	\$ 1218.00	0.12
1.5	1014	\$ 25.50	\$ 252.84	\$ 1264.20	0.12

Boiler Room



Operating Temperature, *F
Ambient Temperature, *F
Insulation selected

Emittance of Surface
Expected Useful Life of Insulation System
Operating hours per year
Efficiency of fuel Conversion%
Selected fuel

0.95
20 yrs.
8760
85%
Natural Gas

THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	7986	\$ 200.88	\$ 200.88	\$ 1004.40	0.54
1	1080	\$ 27.18	\$ 173.70	\$ 868.50	0.09
1.5	786	\$ 19.80	\$ 181.08	\$ 905.40	0.09

Boiler Room



Operating Temperature, *F Ambient Temperature, *F Insulation selected	Emittance of Surface Expected Useful Life of Insulation System Operating hours per year Efficiency of fuel Conversion% Selected fuel	0.95 20 yrs. 8760 85% Natural Gas
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THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	30420	\$ 764.64	\$ 764.64	\$ 3823.20	2.16
1	4212	\$ 106.20	\$ 658.44	\$ 3292.20	0.36
1.5	3132	\$ 78.48	\$ 686.16	\$ 3430.80	0.36

Boiler Room



Operating Temperature,	76°C	Emittance of Surface	0.95
Ambient Temperature,	24°F	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	22560	\$ 567.40	\$ 567.40	\$ 2837.00	1.4
1	3040	\$ 76.40	\$491.00	\$ 2455.00	0.2
1.5	2240	\$ 56.40	\$ 511.00	\$ 2555.00	0.2

Air Conditioning Room



Operating Temperature,	82*°C	Emittance of Surface	0.95
Ambient Temperature,	24*°C	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr	5yr.	CO2 EMMISSIONS
			SAVINGS.	SAVINGS	
0	16980	\$ 426.96	\$ 426.96	\$ 2134.80	0.54
1	2280	\$ 57.24	\$ 369.72	\$ 1848.60	0.06
1.5	1656	\$ 41.76	\$ 385.20	\$ 1926.00	0.06

Air Conditioning Room



Operating Temperature,	80°C	Emittance of Surface	0.95
Ambient Temperature,	24°C	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr	5yr.	CO2 EMMISSIONS
			SAVINGS.	SAVINGS	
0	23280	\$ 585.30	\$ 585.30	\$ 2926.50	0.6
1	3210	\$ 81.00	\$ 504.30	\$ 2521.50	0.15
1.5	2430	\$ 60.90	\$524.40	\$ 2622.00	0.15

Air Conditioning Room



Operating Temperature,	52C	Emittance of Surface	0.95
Ambient Temperature,	23°C	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST	1styr	5yr.	CO2
		\$/yr	SAVINGS.	SAVINGS	EMMISSIONS
0	13482	\$ 338.94	\$ 338.94	\$ 1694.70	0.42
1	2310	\$ 57.54	\$ 281.40	\$ 1407.00	0
1.5	1596	\$ 39.90	\$ 299.04	\$ 1495.20	0

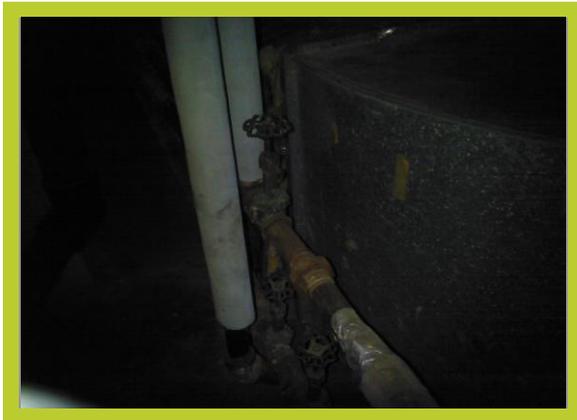
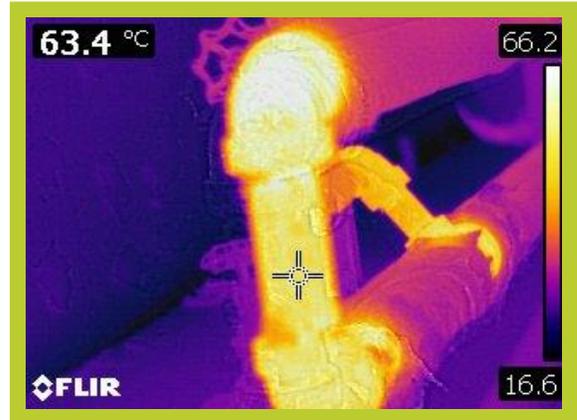
Air Conditioning Room



Operating Temperature,	56°C	Emittance of Surface	0.95
Ambient Temperature,	24°C	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	12432	\$ 312.90	\$ 312.90	\$ 1564.50	0.42
1	2268	\$ 57.12	\$ 255.78	\$ 1278.90	0
1.5	1596	\$ 47.04	\$ 265.86	\$ 1329.30	0

Tunnel Under District Office

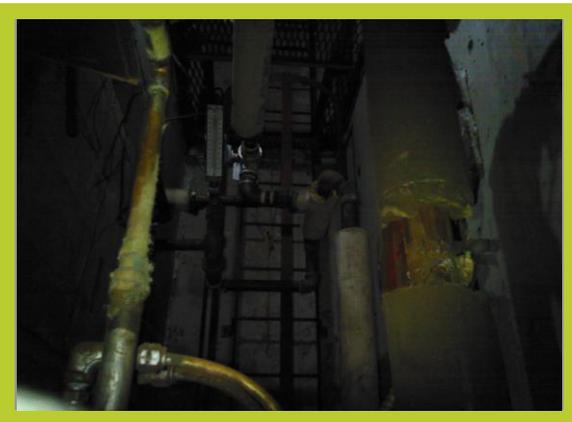
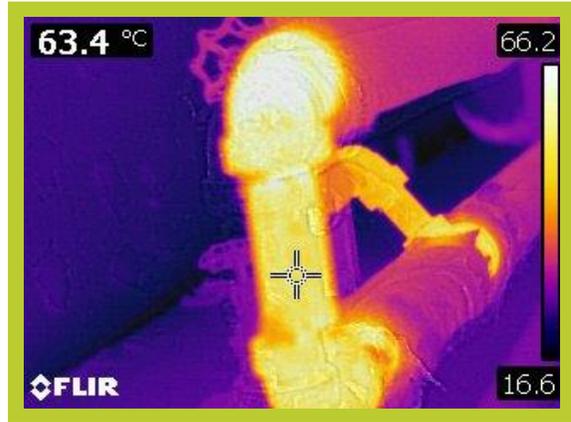


Operating Temperature, *C
 Ambient Temperature, *C
 Insulation selected Fiberglass

Emittance of Surface 0.95
 Expected Useful Life of Insulation System 20 yrs.
 Operating hours per year 8760
 Efficiency of fuel Conversion% 85%
 Selected fuel Natural Gas

THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	199890	\$ 5025.18	\$ 5025.18	\$ 25125.90	13.2
1	28392	\$ 714.90	\$ 4310.28	\$ 21551.40	1.62
1.5	21636	\$ 541.74	\$ 4483.44	\$ 22417.20	0.96

Tunnel Block A

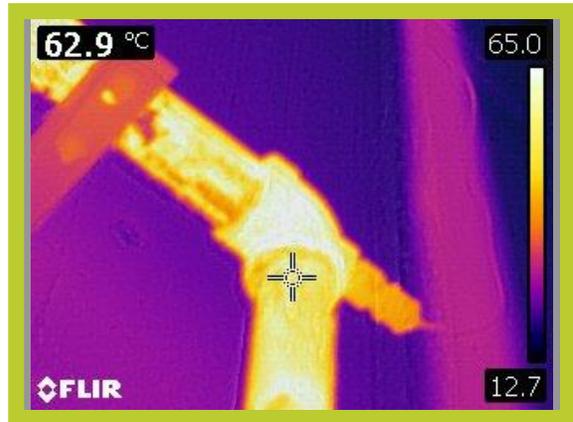
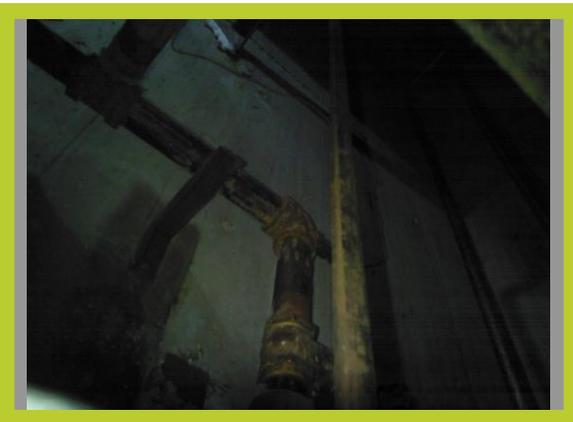
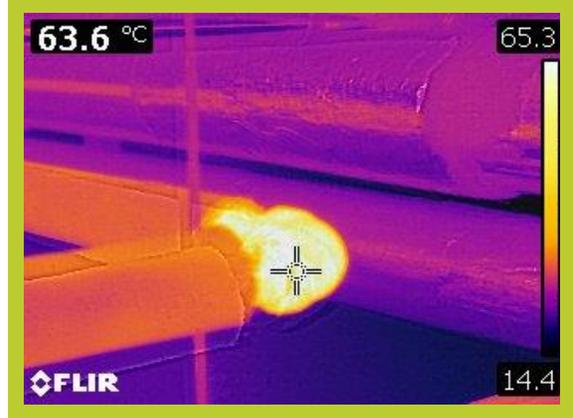


Operating Temperature,	*C	Emittance of Surface	0.95
Ambient Temperature,	*C	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST	1styr	5yr.	CO2
		\$/yr	SAVINGS.	SAVINGS	EMMISSIONS
0	167118	\$ 4198.38	\$ 4198.38	\$ 20991.90	11.04
1	24780	\$ 620.70	\$ 3577.68	\$ 17888.40	1.98
1.5	19308	\$ 488.16	\$ 3710.22	\$ 18551.10	0.06

*Estimated Calculations supplied by 3E Plus Mechanical Insulation Energy Calculator *

Tunnel Block B



Operating Temperature, *C		Emittance of Surface	0.95
Ambient Temperature, *C		Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	174348	\$ 4387.38	\$ 4387.38	\$ 21936.90	11.52
1	26166	\$ 660.90	\$ 3726.48	\$ 18632.40	0.9
1.5	20376	\$ 507.36	\$3880.02	\$ 19400.10	0.66

*Estimated Calculations supplied by 3E Plus Mechanical Insulation Energy Calculator *

Tunnel Block C

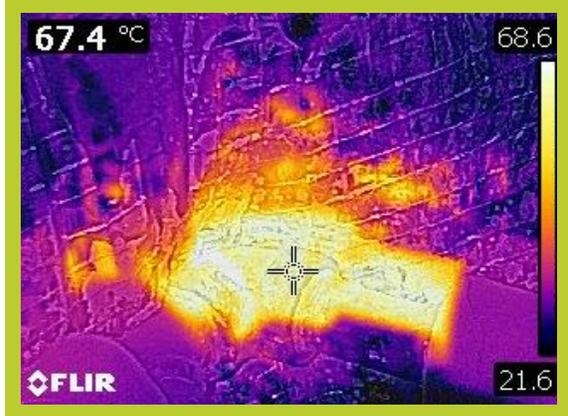


Operating Temperature,	*C	Emittance of Surface	0.95
Ambient Temperature,	*C	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST	1styr	5yr.	CO2
		\$/yr	SAVINGS.	SAVINGS	EMMISSIONS
0	143370	\$ 3606.48	\$ 3606.48	\$ 18032.40	9.18
1	21510	\$ 541.98	\$ 3064.50	\$ 15322.50	0.6
1.5	16512	\$ 414.00	\$ 3192.48	\$ 15962.40	0

*Estimated Calculations supplied by 3E Plus Mechanical Insulation Energy Calculator *

Tunnel Block D



Operating Temperature,	*C	Emittance of Surface	0.95
Ambient Temperature,	*C	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	84842	\$ 2133.48	\$ 2133.48	\$ 10667.40	5.18
1	12862	\$ 322.58	\$ 1810.90	\$ 9054.50	0.48
1.5	10030	\$ 252.32	\$ 1881.16	\$ 9405.80	0

*Estimated Calculations supplied by 3E Plus Mechanical Insulation Energy Calculator *

Tunnel Block E

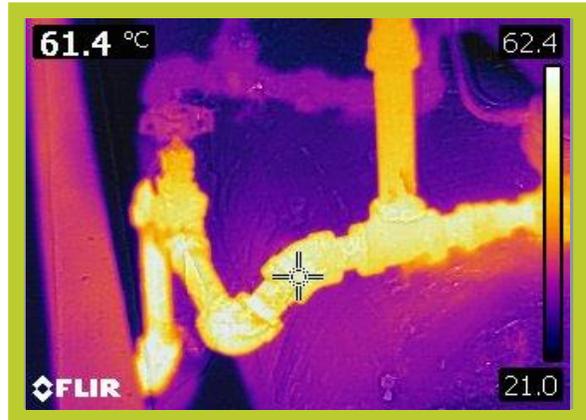
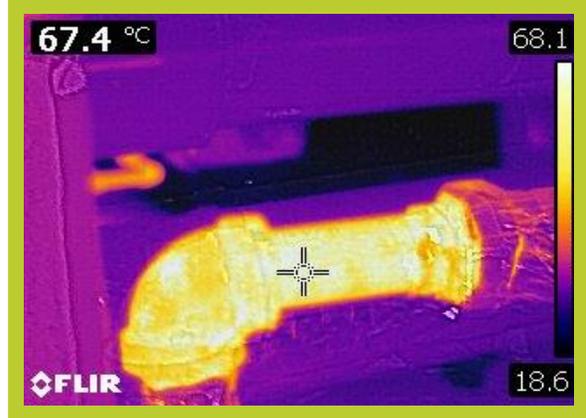


Operating Temperature, *C	22.0	Emittance of Surface	0.95
Ambient Temperature, *C	20.6	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST \$/yr	1styr SAVINGS.	5yr. SAVINGS	CO2 EMMISSIONS
0	184646	\$ 4639.94	\$ 4639.94	\$ 23199.70	13.34
1	27926	\$ 703.82	\$ 3936.12	\$ 19680.60	0.36
1.5	21794	\$ 545.86	\$ 4094.08	\$ 20470.40	0

*Estimated Calculations supplied by 3E Plus Mechanical Insulation Energy Calculator *

Tunnel F Block

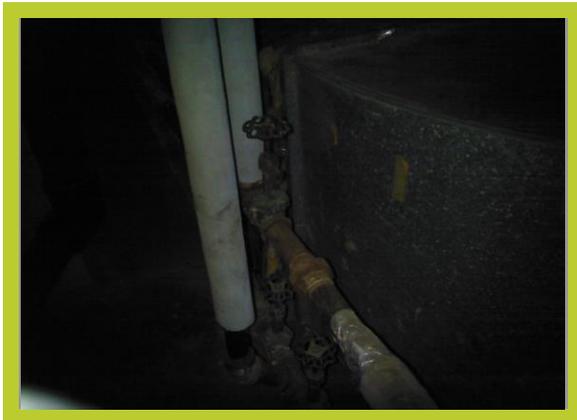


Operating Temperature,	*C	Emittance of Surface	0.95
Ambient Temperature,	*C	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST	1styr	5yr.	CO2
		\$/yr	SAVINGS.	SAVINGS	EMMISSIONS
0	164052	\$ 4126.08	\$ 4126.08	\$ 20630.40	6.42
1	24924	\$ 625.10	\$ 3500.98	\$ 17504.90	0.33
1.5	19296	\$ 486.66	\$ 3639.42	\$ 18197.10	0.06

*Estimated Calculations supplied by 3E Plus Mechanical Insulation Energy Calculator *

Tunnel G Block



Operating Temperature,	*C	Emittance of Surface	0.95
Ambient Temperature,	*C	Expected Useful Life of Insulation System	20 yrs.
Insulation selected	Fiberglass	Operating hours per year	8760
		Efficiency of fuel Conversion%	85%
		Selected fuel	Natural Gas

THICKNESS	HEAT LOSS	FUEL COST	1styr	5yr.	CO2
		\$/yr	SAVINGS.	SAVINGS	EMMISSIONS
0	57936	\$ 1456.56	\$ 1456.56	\$ 7282.80	1.62
1	8936	\$ 234.96	\$ 1221.60	\$ 6108.00	0
1.5	7436	\$ 187.08	\$1269.48	\$ 6347.40	0

*Estimated Calculations supplied by 3E Plus Mechanical Insulation Energy Calculator *

Results

Simple Payback Period, yrs	1.3
Internal Rate of Return (IRR or ROI)	76.9%
Net Present Value,	\$720,178